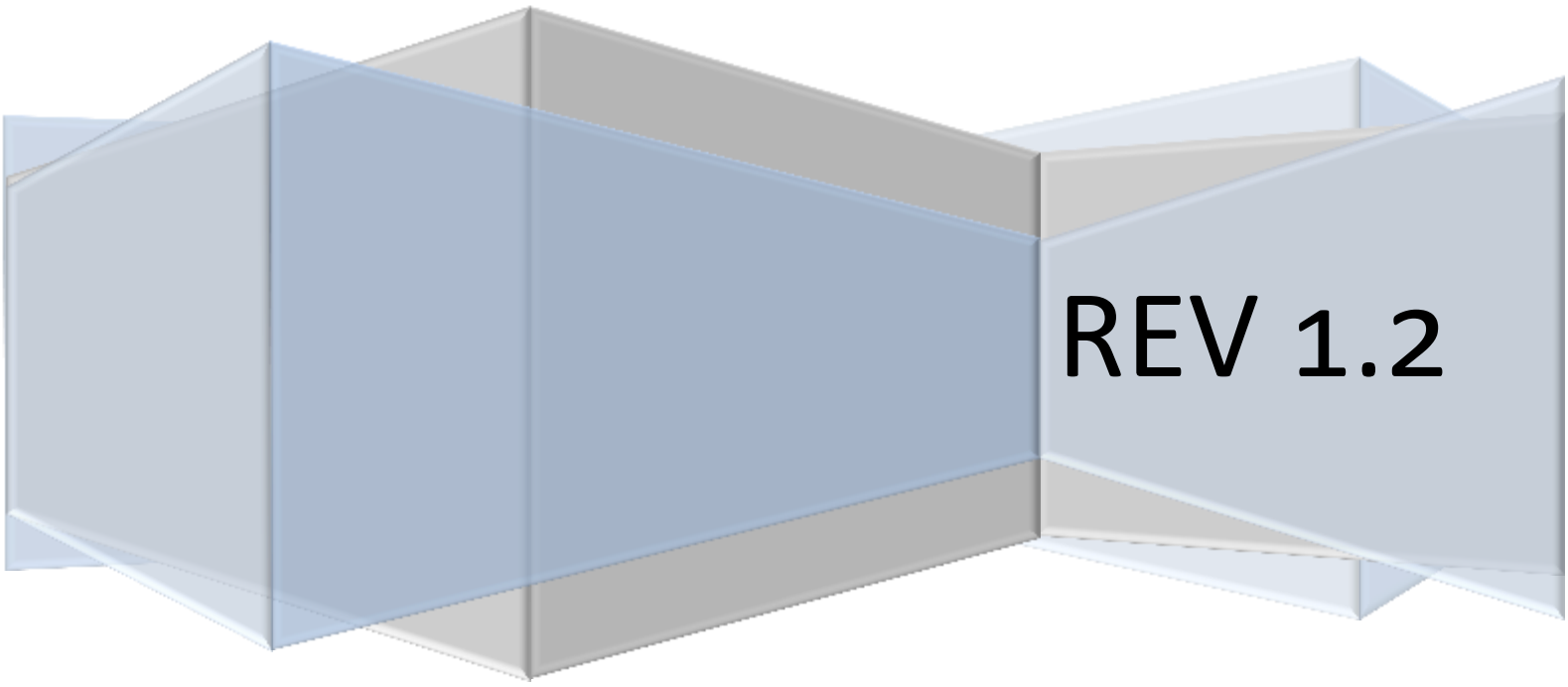
NODIZ Limited

NODIZ Pro™ User Manual

www.NODIZ.co.uk



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INTRODUCTION

The NODIZ Pro™ is a state of the art microprocessor controlled digital stand-alone, fully mappable ignition controller for four cylinder spark ignition engines. It can be used either to replace older distributor based ignition systems for more modern coil packs, or even to allow the running of carburettors on more modern engines which do not feature a distributor drive. **It features in-built coil drivers, so no need for EDIS or any external modules.**

It is truly 3D, giving an advance angle based not only on engine speed but also on engine load, which can be derived from either its optional in-built Manifold Absolute Pressure Sensor (MAP), or using a potentiometer type Throttle Position Sensor (TPS).

The NODIZ Pro™ is incredibly simple to install, and will always arrive pre-loaded with a suitable base-map of your choice. With only seven connections to make, you can be up and running in a matter of minutes, and if you opted for a pre-loomed system, this can be even quicker.

To use the NODIZ Pro™, you will need, at a minimum, the following components. All can be obtained from our website (www.NODIZ.co.uk) or sourced locally.

- **Trigger Wheel** - In the case of modern engines this will probably already either be cast into the flywheel, or fitted to the front pulley. Note that direct support for many OEM trigger wheels is being added. (Currently 36-1, and 60-2 are fully supported, see the website for others.)
- **Crank Sensor** – A standard 2 Wire VR type crank sensor for reading the Trigger Wheel.
- **Coil Pack** – Standard Wasted Spark 'dumb' coil pack. Ford style ones work best and universal ones are available from us.

If you are using a TPS based NODIZ Pro™, then you will also need a 3-wire TPS sensor fitted to your throttle linkage/carburettor(s).

In addition to the above most direct and simple installation, the NODIZ Pro™ also features the following (some features require the use of the NODIZ Pro™ Power Suite Windows software to set them up, or we can carry out a setup at time of ordering for you):

- 16 Load by 16 Speed Sites, with full 3D interpolation and user definable Speeds/Loads.
- User settable RPM Soft and Hard Cut Rev Limiters.
- Coolant based ignition adjustment map (To add advance to cold engines, etc.).
- Intake Air Temperature ignition adjustment map, to allow timing retarding based on intake temperature to reduce pinking on very high intake temperatures.
- Cranking based advance angle to help start high compression engines.
- A programmable Shift Light output.
- 5v Tachometer Output.
- A programmable output based on either RPM (i.e. V-TEC control), coolant temperature (i.e. Fan Control), Intake temperature (i.e. Water Injection control), or Manifold Pressure (i.e. for 5th Injector systems).
- Bluetooth™ Communications built in, with USB PC/Laptop dongle supplied.

There is a full video guide on our website, at www.NODIZ.co.uk, which runs through the installation and setup procedure for this powerful stand-alone ignition controller.

THE NODIZ PRO™ UNIT AND CONNECTIONS

BUTTONS AND INDICATOR LEDS

INDICATOR LEDS

The RED LED indicates that the unit is powered up. If this light does not illuminate when power is supplied to the NODIZ Pro™, or flashes slowly, refer to the troubleshooting section.

The BLUE and GREEN LED indicate a variety of information. In normal running use, they signify the firing of Coil A and B, hence they will alternately flash at a speed that relates to the engine speed.

They also indicate entry into different setup modes, and these are detailed in the relevant section.

BUTTONS

The two push buttons on the NODIZ Pro™ are used to set different modes, adjust base offset and also to factory reset the unit. Holding down the button(s) shown **during turning the power on,** results in the actions shown in the table below being taken:

BUTTON A (Outermost)	**BUTTON B (Innermost)**	**RESULT**
HELD	OFF	Offset Angle Calibration Mode/Fixed Ignition firing at 0* TDC
OFF	HELD	Throttle Position Sensor Calibration Mode
HELD	HELD	Factory reset of the NODIZ Pro™.

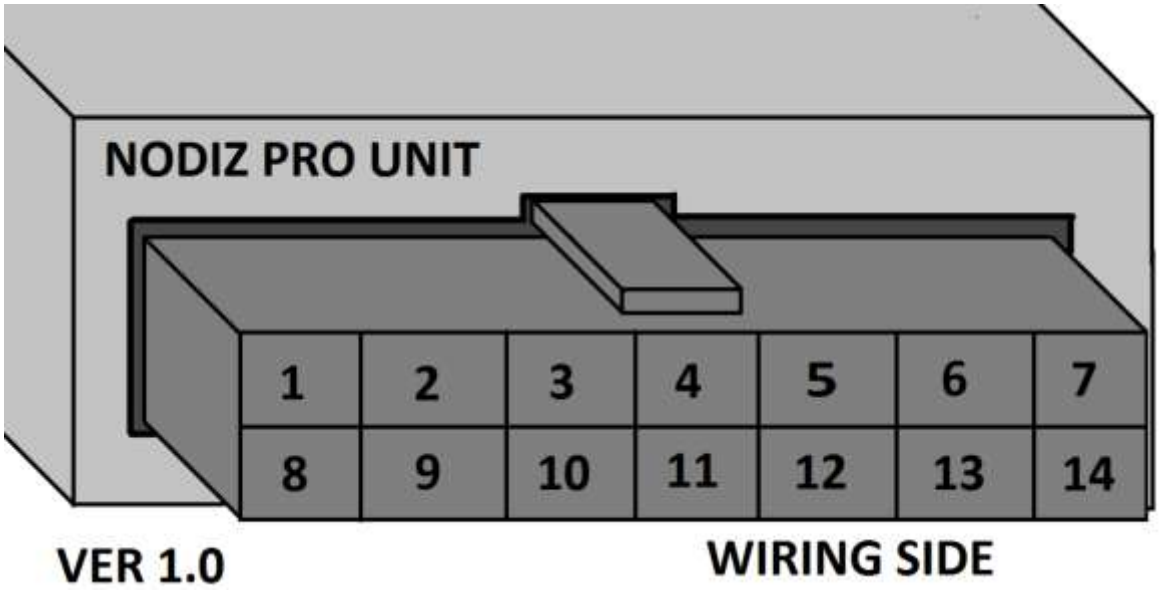
The buttons have different functions in different modes, and the relevant sections in this manual detail their functions in those modes.

MAIN LOOM CONNECTIONS

The NODIZ Pro™ features an automotive standard connector for various connections to be made to the engine and other systems. The main connector is a 14-way black MOLEX style plug.

The colours of the wires on pre-made and semi-terminated looms are also shown.

Pin Number (Colour)	Function
1 SHIELDED	Crank Sensor *(It does not matter which way*
2 CABLE	Crank Sensor *round these are connected…)*
3	Shift Light Output *(500mA Switched Earth)*
4	Tachometer Output *(For 5V digital tachometers)*
5 (YELLOW)	ADC1 (Coolant Temperature Sensor)
6 (ORANGE)	ADC2 (Inlet Air Temperature Sensor)
7 (RED)	12V Main Power *(To be switched on by the key)*
8 (PURPLE)	TPS/MAP Sensor Reference (5V)
9 (PINK)	TPS/MAP Sensor Signal
10 (BLACK)	GROUND
11	Programmable Output *(500mA Switched Earth)*
12	Launch Control Active *(when connected to Earth)*
13 (BLUE)	COIL A –ve Feed *(Switched Earth)*
14 (GREEN)	COIL B –ve Feed *(Switched Earth)*



There is also (on the MAP based NODIZ Pro™) a 4mm vacuum fitting which should be connected to the intake manifold to read its pressure.

HARDWARE INSTALLATION

MOUNTING OF THE NODIZ PRO™ UNIT

The NODIZ Pro™ unit is supplied in a sealed aluminium case, and has been tested and shown to operate fully submerged in water, strapped to a hot exhaust manifold and even dragged along the road, however, it is best practice to mount the unit away from areas where it could become wet or overheated, as this will ensure longevity.

Most users generally mount the unit using sticky back Velcro pads to allow for easy removal (an added immobilisation feature when leaving the car unattended at shows), though a hard mounting bracketing kit can be supplied if required.

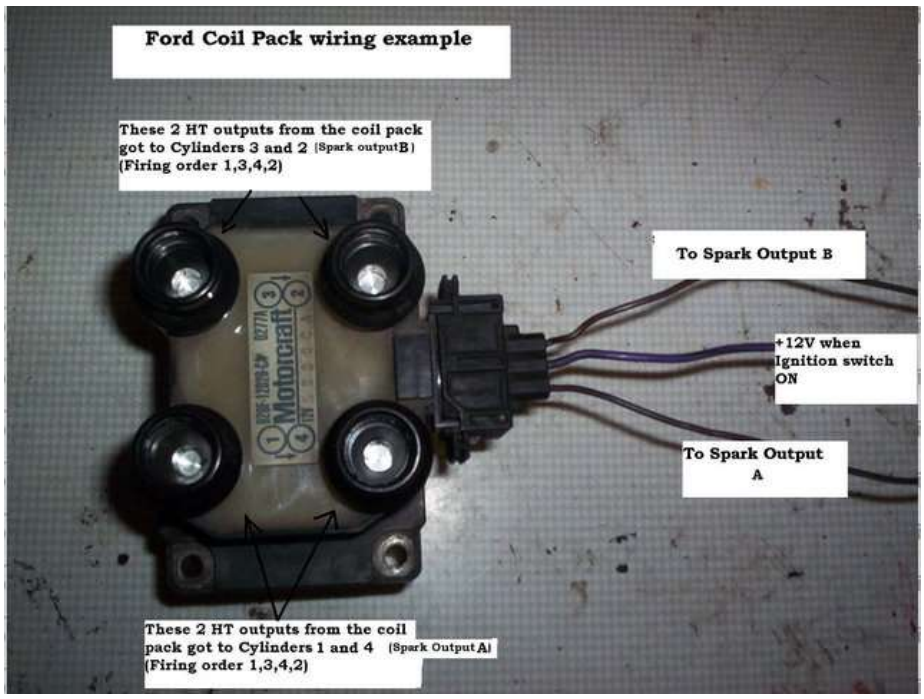
The case itself does not need to be earthed, and so can be mounted to painted/non-metallic surfaces.

TRIGGER WHEEL AND CRANK SENSOR INSTALLATION

COIL PACK INSTALLATION

The coil pack to be used is a standard OEM Ford Four Cylinder Coil-pack, as fitted to most Fords from 1994 Fiesta/Escort models though to current Ford Focuses/Mondeo models. If you are unsure of the type, please see our website, www.NODIZ.co.uk.

The pin out of a typical coil pack is shown below:


Ford Coil Pack wiring example
These 2 HT outputs from the coil pack got to Cylinders 3 and 2 (Spark output B) (Firing order 1,3,4,2)
To Spark Output B
+12V when Ignition switch ON
To Spark Output A
These 2 HT outputs from the coil pack got to Cylinders 1 and 4 (Spark Output A) (Firing order 1,3,4,2)

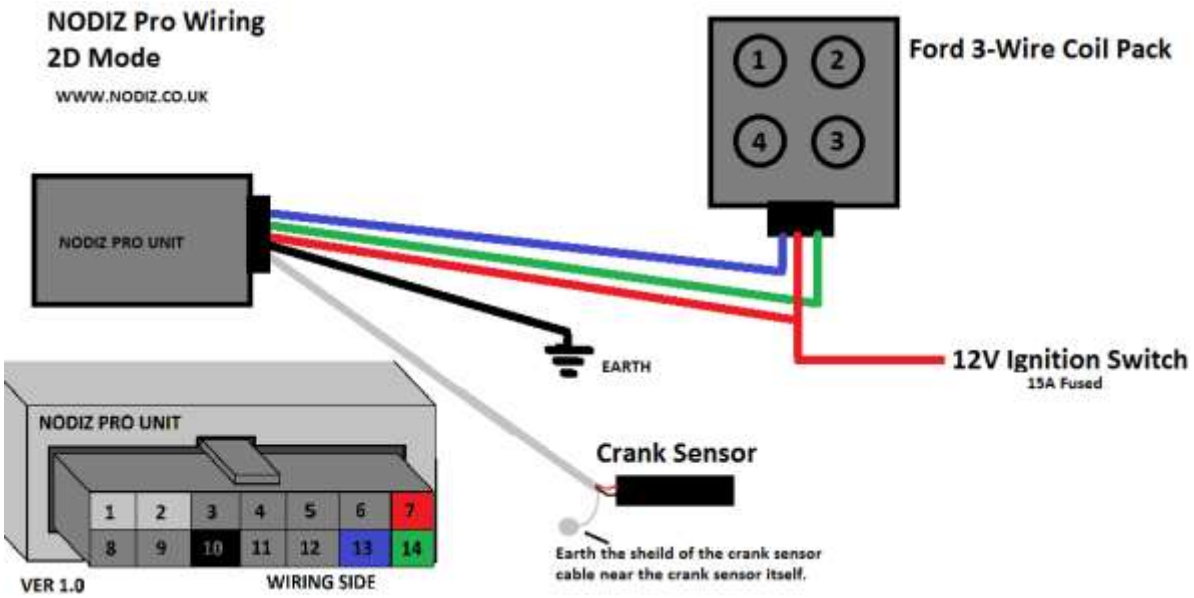
GENERAL WIRING

Although the NODIZ Pro™ has been designed using the very latest noise-immune practices and components, it is still important to follow these basic, commonly accepted wiring principles when wiring/routing the wiring loom:

- Keep the NODIZ Pro™ unit and crank sensor wiring as far from the HT system as sensibly possible (HT leads, Coil Pack and Plugs). Around 500mm (rarely as much is needed in practice) spacing is more than adequate.
- Ensure no wires run where chafing or heat are likely to damage them. If passing through a bulkhead be sure to use grommets where required.
- Ensure no wires are under stress or undue tension.
- Try not to run the crank sensor wiring in the same conduit as the coil output wires, alternator wiring, or any other sources of electrical noise.
- Always use suitable shielded cable for crank sensor wiring, and be sure to earth the outer shield to the chassis.
- Ensure any ground/earth wires are of a strong connection to the chassis.
- Ensure that the main power wire to the NODIZ Pro™ does not 'switch off' during cranking, as can be the case on some classic cars. It must remain live (around 8-14v) when both cranking AND running.
- Always solder and heat-shrink wiring where possible. Bullet connectors and Scotch-Locks are not the best practices to ensure longevity, and are often sources of reliability issues.

NODIZ PRO™ WIRING (2D MODE)

The following diagram illustrates the most simple of NODIZ Pro™ installations. In this mode, there is no load compensation, so the unit works in a 2D fashion, using engine speed alone (much like a distributor) to map the advance curve. The easy-to-use nature of the NODIZ pro™ means that this setup requires just five connections to be made…



WIRING OF THE THROTTLE POSITION SENSOR (TPS 3D MODE)

The throttle position sensor (TPS) is used to tell the NODIZ Pro™ the current throttle position. It should be of a three wire variety (as in most OEM cases and also if supplied by us.)

First, we must determine what the connections are on your TPS. As a guide, generally, the middle connection is the TPS signal, but follows this simple guide below to ensure you make the right connections:

1) Set your multi-meter to measure resistance in the order of 1 or 2 Mega-Ohms.

2) Connect it to two of the connections on the TPS sensor

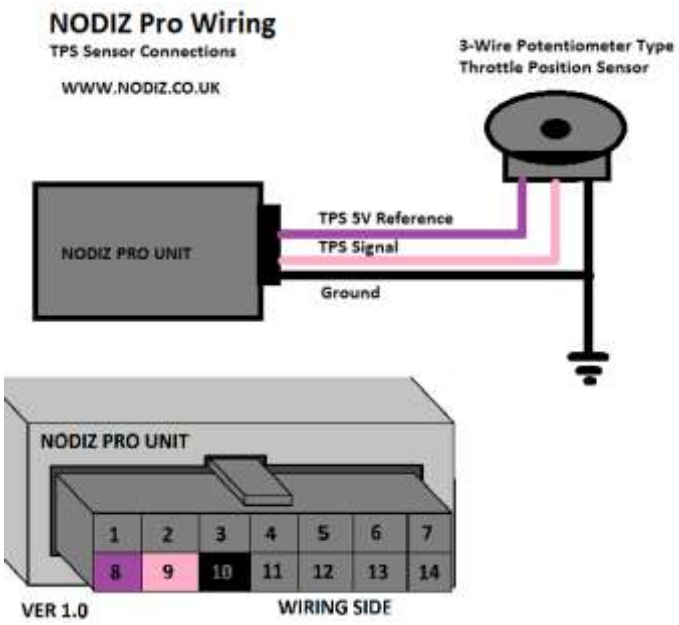
3) Sweep the throttle slowly from CLOSED to OPEN, whilst watching the resistance reading.

If the reading on the multi-meter stays the same, then you have found the GROUND and TPS VOLTAGE REFERENCE wires, although we do not yet know which is which.

If the reading starts HIGH, and then REDUCES, then you are connected with the TPS SIGNAL wire and TPS VOLTAGE REFERNECE wires, although we do not yet know which is which.

If the reading starts LOW and INCREASES then you are connected with the TPS SIGNAL and the GROUND connection, although we do not yet know which is which.

By changing the pins that you are taking the readings from and going back to step three, you will eventually be able to mark each wire with GROUND, TPS SIGNAL and TPS VOLTAGE REFERENCE.



OPTIONAL SYSTEMS WIRING

The NODIZ Pro™ features several optional systems, which can be used if you wish.

TACHOMETER OUTPUT

The NODIZ Pro™ features a 5v 50% Duty tachometer output that can be used to drive modern or aftermarket tachometers. For traditional 12v tachometers, a diode pack will be needed to drive the tachometer, which is available from our website.

COOLANT AND INTAKE TEMPERATURE SENSORS

NOT YET IMPLEMENTED IN VERSION 1.

MAP SENSOR PLUMBING

On NODIZ Pro™ units with the MAP sensor upgrade, a 4mm bulkhead fitting is provided on the unit to facilitate connection of a 4mm silicone hose which should then be connected to the intake manifold to read to the manifold pressure. This must be connected to the manifold between the throttle and intake face of the engine, usually the same location as the brake servo take off can be used.

OEM/BOSCH MAP SENSOR SUPPORT

The NODIZ Pro™ also allows the use of any 5v MAP Sensor, although currently we have corrected curves for most Bosch Types. If you are using a different sensor, then an accurate MAP reading will not be given, however, if you are willing to overlook this and use a 0-100 scale to represent maximum vacuum to maximum pressure, then indeed, any sensor can be used. Use the TPS Reference to power the MAP sensor, and return the sensors signal into the TPS pin as usual.

AUXILLARY OUTPUTS (SHIFT LIGHTS, VVT, FAN, FUEL PUMP ETC)

NOT YET IMPLEMENTED IN VERSION 1.

BASIC SETUP/CALIBRATING

There are two methods of setup. The easiest method is without the use of a PC/Laptop, and uses the unit itself to setup base timing (in effect 'twisting' the distributor), as well as calibrate the throttle position sensor (if used). The second method uses the PC/Laptop to allow full calibration of the ignition map, as well as a host of other features. We suggest that the first method is used to get the engine running, and then optimisation can be carried out afterwards using a PC/Laptop.

BASE TIMING/IGNITION OFFSET ANGLE SETUP

The NODIZ Pro™ enables you to accurately set the 0* point by offering a mode called fixed firing. In this mode, the system will always fire its ignition coil on channel A at what it believes to be 0*, or TDC. Use this mode to check the position of Crank Sensor, trigger disc missing tooth angle, and correct coil wiring. You will also be able to adjust the 'OFFSET ANGLE' using the buttons from within this mode, to ensure that, for example, a commanded advance of 15* BTDC really is 15* BTDC and not out by any amount.

IT IS RECOMENDED YOU DISCONNECT THE ENGINES FUEL SUPPLY OR INJECTORS TO PREVENT THE ENGINE FIRING DURING THIS INTITIAL SETUP PHASE. CARBURETTERS WILL USUALLY CONTAIN A SMALL AMOUNT OF FUEL IN FLOAT CHAMBERS SO THE ENGINE MAY 'POP' ON REMAINING FUEL, BUT THIS IS NORMAL.

ENTERING BASE TIMING SETUP MODE

To enter this mode, with the NODIZ Pro™ all wired, and the ignition switched off, HOLD DOWN Button A (Outermost). Next, turn on the ignition. The RED Power LED will illuminate, and the GREEN LED and the BLUE LED will be OFF. Release Button A. The GREEN LED will flash four times. You are now in Base Timing/Offset Setup Mode.

CHECKING/ADJUSTING BASE TIMING

First you must establish the TDC position of your engine. You can either use the factory timing marks (although not always accurate!) or manually turn the engine to TDC, and mark the bottom pulley and a fixed reference point on the block, such that it can be seen with a timing light.

Next, using a timing-light, reading from cylinder one's HT lead, verify the position of the firing point in relation to the engines TDC mark by cranking the engine. If you see no flashes from the timing gun, refer to the trouble shooting section.

Next, (and it is best to do this whilst cranking the engine) press **Button A (OUTTERMOST) to INCREASE** the Base Offset Angle, or **Button B (INNERMOST) to DECREASE** it. You will notice that the mark you made on the bottom pulley will move closer or further away from the TDC mark as the system changes its base offset angle.

The objective is to get the timing light to flash, showing that the engine is firing when your TDC marks align, i.e. firing at ZERO degrees, or TDC.

You will only be able to adjust the offset by 20 degrees either way, hence why it is important to ensure that your fitment and relationship of the trigger wheel and sensor are as close as possible such that the missing gap passes the sensor when the engine is turned to 90* BTDC.

Once you are happy with the firing at TDC, simply turn off the ignition, and the Base Offset/Base Timing position will be permanently stored in the NODIZ Pro™.

THROTTLE POSITION SENSOR (TPS) CALIBRATION

The NODIZ Pro™ offers the ability to use a Throttle Position Sensor, or TPS, as a means of determining load. This is more common for use on Individual Throttle Body/Twin Carbs or Motorbike Carbs fuelled engines, as reading a MAP sensor value from these types of engines requires extra piping and take-offs needing to be fitted.

ENTERING TPS CALIBRATION MODE

To enter Throttle Position Sensor calibration mode, with the ignition switched off, hold down BUTTON B (the innermost button), and turn the ignition on whilst keeping this button depressed. The NODIZ will flash the BLUE and GREEN LEDs together to show to that TPS calibration has been entered. You are are now in TPS calibration mode. The engine will not run in this mode.

CALIBRATING THE TPS

Whilst in TPS Calibration Mode, simply sweep the throttle from open to closed several times. You will notice that the LEDs flash at different rates to indicate throttle position.

You can now check that the throttle wiring and TPS sensors are working correctly by slowly opening and closing the throttle, and noticing that the LEDs flash faster with higher throttle openings, and more slowly as you near closed throttle. If this is not the case, refer to the relevant trouble shooting section.

If you make a mistake at any point, return to the section above on entering TPS Calibration mode, and follow the instructions again.

Once you are happy with the TPS calibration, Press Button B again. The TPS limits are now stored, and the NODIZ Pro™ unit is now calibrated. Switch the ignition off and then on again with no buttons depressed to return to normal running mode.

CONNECTING TO YOUR PC/LAPTOP WITH BLUETOOTH™

The NODIZ Pro™ is equipped with an in-built Bluetooth™ module which means for testing, setup and mapping you can use either a laptop (many of which feature in-built Bluetooth™ connectivity) or a PC with the supplied Bluetooth™ USB dongle, or an Android Mobile phone, (visit us at www.NODIZ.co.uk to download the app, or search NODIZ on the Market Place). The range is approximately 20 meters.

SETTING UP THE USB DONGLE

The following is a guide for Windows 7 based PCs. Other versions of Windows are supported, but at the time writing have not been tested, though the setup process will be fundamentally the same.

STEP ONE

First install the USB Dongle into an unused USB port on your PC/Laptop.

Windows should automatically detect the USB dongle, and will install it. After this is completed, the following logo should appear in the lower right corner of the screen on the task bar:

Now right click the image and from the pop-up menu select '**Add a Device'**.

Note that you will only need to do this the first time you link the NODIZ to your PC with the Bluetooth dongle. After successful connection, this will from then on be automatic.

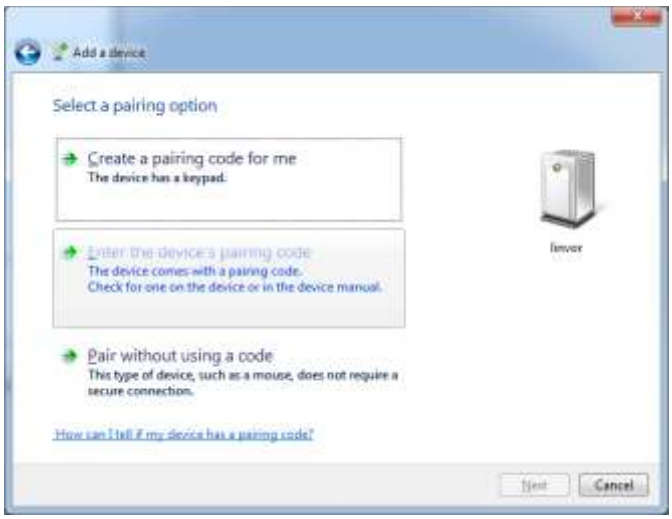
Be sure to have the NODIZ Pro™ unit powered and in range of the PC/Laptop at this point!

The following dialog will be presented, and after a short time the empty white box will show a device named 'Linvor':

Select a device to add to this computer
Windows will continue to look for new devices and display them here.
linvor
Bluetooth
Other
What if Windows doesn't find my device?
Next
Cancel

Double-click this new icon, and 'Connecting to device' will be shown at the bottom of the dialog.

After a brief moment, the following dialog will appear, be sure to click the middle option 'Enter device pairing code':

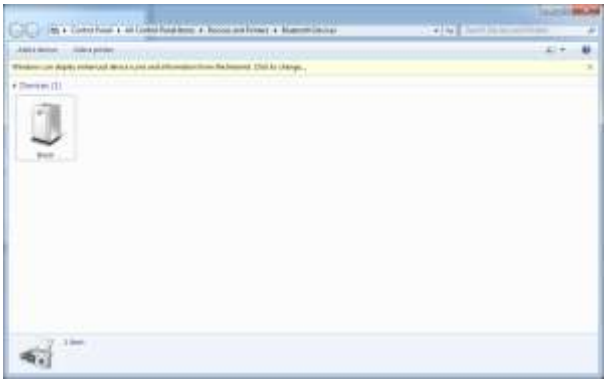

Add a device
Select a pairing option
Create a pairing code for me
The device has a keypad.
Enter the device's pairing code
The device comes with a pairing code.
Check for one on the device or in the device manual.
Pair without using a code
This type of device, such as a mouse, does not require a secure connection.
How can I tell if my device has a pairing code?
linvor
Next
Cancel

An input box will appear asking for the pairing code. Enter your units four digit serial number in the box (for example "3408") and hit OK. After a moment a 'Device Ready to Use' notification should appear in the lower right of the screen, you may even catch which Com Port number it is assigned (usually COM10 or COM11, but varies with each PC.)

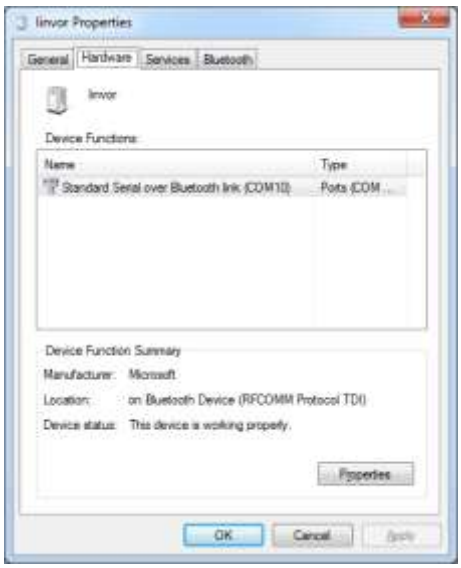
Next we must confirm what port number the unit has been given.

Right click the little Bluetooth™ icon on the task bar again, and this time click '**Show Bluetooth Devices'.**

If all has gone well so far, the following should be shown:



Note the ‘linvor’ device. This is the NODIZ Pro™ Bluetooth module. Double click to show the devices properties, and then click the second ‘Hardware’ tab:



Note the COM port number; in this case, it is on port COM10. This is the communications port that the NODIZ Pro™ will be communicated with in the Tuning Suite software.

You have now successfully configured the Bluetooth™ module and your PC/Laptop is ready to be used with the NODIZ Pro™. Be sure to always have the Dongle in the USB port when attempting to connect to the unit. You will not need to repair the system every time you want to use it, typically you only need to do this once for each PC/Laptop you wish to use for tuning.

NODIZ PRO™ TUNING SUITE (WINDOWS)

The tuning suite is designed to run on Windows XP/Vista/7 32 or 64 bit versions. It allows full mapping abilities as well as a host of data-logging features, advanced module setup and features control.

The latest version is always available on the www.nodiz.co.uk website, as well as links to the latest versions of the Microsoft .NET framework which it requires to run.

An in-depth tuning guide video and software walkthrough will soon be available on our website.

INSTALLING THE NODIZ PRO™ TUNING SUITE

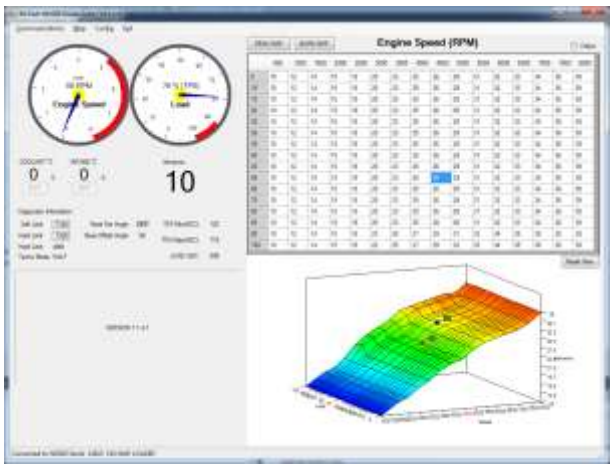
After downloading the NODIZ Pro™ Tuning Suite from the website, simply extract the software to a folder of choice, and double click the 'setup' icon. After a brief delay, the software will be installed, and a shortcut will be placed in your start menu. You can launch the NODIZ Suite from the start menu at any time.

CONNECTING TO THE NODIZ PRO™ UNIT

After you have successfully paired the Bluetooth™ system, as per the instructions above, you are ready to connect to the NODIZ Unit to begin setup and tuning.

1. Switch on the ignition, as to power the NODIZ Pro™, and then start the tuning suite.
2. From the 'Communications' menu, select the correct comms port from the Port menu. You should be selecting the port we found earlier when pairing the Bluetooth™ module.
3. Now, press 'Connect'.

If all goes well, after a short delay, two gauges will appear on the screen, and the display should resemble the below:



If the gauges appear but the map does not, press 'READ MAP' to refresh the connection. The map should now be populated.

HINT: You can re-orientate the 3D view by left or right clicking and dragging the mouse on the 3D view.

MAIN DISPLAY

LIVE MAPPING

You can adjust the map in real-time with the engine running to have an instant effect on the ignition timing. It i

HINT: Changes to the map are not stored to the NODIZ Pro™ permanent memory until 'BURN MAP' is pressed. Any changed ignition numbers are shown in RED.

Click on the mapping grid of numbers, and use the arrow keys to navigate the map. Note the 3D map shows current position also.

Use the 'Q' and 'W' keys to decrease and increase the advance at the selected cursor position. The minimum advance is zero degrees, and the maximum is 55 degrees BTDC.

Be sure to press 'BURN MAP' when you are happy with the changes. Failure to do so will mean the unit will 'forget' your changes when the power is cycled.

The engine may stutter during burning the map as all data is refreshed and saved.

SAVING YOUR MAP

It is recommended that you routinely save your map files before making changes, or if you are moving the unit to a different engine, it is useful to keep the maps saved for use in the future.

1. With the unit connected and powered, simply go to the 'Map' menu, then 'Save to MAP File…' option.
2. Select a folder and file name in the usual manner, and press Save.
3. Your Map file is now saved to your computer.

Be sure to share your map on the NODIZ Pro™ forums (on the main www.NODIZ.co.uk website) to help others get going!

INSTALLING A SAVED MAP FILE

You can install any NODIZ map from any version of NODIZ or engine. This is handy for installing a different basemap, or a friend's map that is a similar engine type.

HINT: You can download the latest Basemap Pack from the NODIZ Pro™ website.

1. To install a map file, with the unit connected, go to the 'Map' menu and press "Open and Burn MAP file…".
2. Navigate to the folder where your *.NODIZ file/map is saved, and select it.
3. Press 'Open'.
4. The tuning suite will show a progress bar in the lower left, and once completed the map file will be burned to the controller.

NODIZ PRO™ ANDROID DIGITAL DASH

Because the NODIZ Pro™ supports Bluetooth™ connectivity, we have created a free digital dashboard application for your Android Mobile phone/tablet. Search for 'NODIZ' in the Google Play/Android Market store.

HINT: You can only connect one system at a time to the NODIZ Pro™, so if tuning with a laptop, switch off the Bluetooth on your phone, and vice-versa…

With a simple bracket, your phone or tablet becomes a full featured digital dashboard with data-logging, perfect for track and race use, as well to check the functions of the NODIZ Pro™ module.

The dashboard shows the following information:

- Speed in MPH (must have a GPS enabled phone/tablet)
- Engine RPM
- Current Advance Angle
- Throttle Position *(if utilized and configured on the NODIZ Pro™)*
- Coolant Temperature *(if utilized and configured on the NODIZ Pro™)*
- Intake Temperature *(if utilized and configured on the NODIZ Pro™)*

The display will also flash brightly if you have a shift-light RPM set, and the RPM is greater than the shift-light RPM.